

Thompson Creek Mine Wetland and Stream Mitigation Plan

Squaw Creek



Thompson Creek Mining Company



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Revised January 2014

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Custer County, Idaho

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Acronyms

BLM	Bureau of Land Management
cfs	cubic feet per second
CWA	Clean Water Act
EPA	Environmental Protection Agency
FAC	facultative
FACW	facultative wetland
GPS	global positioning system
HDR	HDR Engineering, Inc.
IDFG	Idaho Fish and Game Department
IDWR	Idaho Department of Water Resources
NOAA	National Oceanic and Atmospheric Administration
OBL	obligate wetland
OHW	ordinary high water mark
PEM	palustrine emergent marsh
PSS	palustrine scrub shrub
TCMC	Thompson Creek Mining Company
UB	upland buffer
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WM	palustrine wet meadow

1.0 INTRODUCTION

This wetland mitigation plan describes proposed wetland and stream mitigation to compensate for the loss of wetland functions and services, and waters of the U.S. associated with the Phase 8 expansion of the Thompson Creek Mine in Custer County, Idaho. As part of the mine expansion, a permit application under Section 404 of the Clean Water Act (CWA) will be filed.

Thompson Creek Mining Company (TCMC), the owner of the Thompson Creek molybdenum mine, proposes to expand the existing waste rock facilities and tailings impoundment at its site about 35 miles southwest of Challis (Figure 1). Located in mountainous terrain, the open-pit mill and tailings facility began operations in 1983 and is the fourth-largest primary molybdenum mine in the world, processing about 28,000 tons of ore per day through its on-site mill.

1.1 Impacts to Aquatic Resources

HDR Engineering, Inc. (HDR) conducted a wetland and ordinary high water mark (OHWM) field study and prepared a delineation report for the proposed Phase 8 expansion in 2009 and 2010. The wetland delineation was conducted because TCMC proposes to expand the existing waste rock facilities and tailings impoundment in areas that support wetlands and other waters of the U.S. that are subject to regulation under the CWA.

Approximately 3.36 acres of wetlands and 9,899 linear feet of stream channels were identified within the proposed expansion area. Of the 3.36 acres of wetlands, 2.93 acres of wetlands are located along Mill Creek. The remaining 0.43 acres of wetlands are small discontinuous areas along Pat Hughes Creek and the West Fork of Bruno Creek. The study area has no large expansive wetlands due to the steep slopes and v-shaped drainages.

1.2 Compensatory Mitigation

The CWA, signed into law in 1972 to restore and maintain the chemical, physical, and biological integrity of the nation's waters, prohibits discharging or placing fill into wetlands, streams, and any other waters unless a permit is issued by the U.S. Army Corps of Engineers (USACE) under Section 404 of the act. Compensatory mitigation is required under a Section 404 permit. In 2008, the Environmental Protection Agency (EPA) and USACE updated their compensatory mitigation standards to promote no net loss of wetlands by improving wetland restoration and protection policies, increasing the effective use of wetland mitigation banks, and strengthening the requirements for the use of in-lieu fee mitigation (EPA/USACE 2008).

Compensatory mitigation is typically accomplished through mitigation banks, in-lieu fee mitigation, and permittee-responsible mitigation, which are described in the following sections.

Each of these three compensatory mitigation mechanisms described above includes the following 12 components:

- Objectives
- Site selection criteria
- Site protection instruments (e.g., conservation easements)
- Baseline information (for impact and compensation sites)
- Methodology for determining mitigation bank credits
- Mitigation work plan
- Maintenance plan
- Ecological performance standards
- Monitoring requirements
- Long-term management plan
- Adaptive management plan
- Financial assurances

1.2.1 Mitigation Bank

A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or, in certain circumstances, preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local wetland regulation. A mitigation bank may be created when a government agency, corporation, nonprofit organization, or other entity undertakes these activities under a formal agreement with a regulatory agency. Upon approval from regulating agencies, permittees may acquire credits from a mitigation bank to compensate for their proposed impacts. Mitigation banks are considered the preferred alternative because the mitigation is already in place (EPA/USACE 2008).

No mitigation banks are currently available in the Salmon River watershed from which credits could be purchased for the TCMC Phase 8 mine expansion.

1.2.2 In-Lieu Fee Mitigation

A permit applicant may make a payment to an in-lieu fee program that would conduct wetland, stream, or other aquatic resource restoration, creation, enhancement, or preservation activities. In-lieu fee programs are generally administered by government agencies or non-profit organizations that have established an agreement with regulatory agencies such as USACE and EPA to use in-lieu fee payments collected from permit applicants. In-lieu fee mitigation is the second preferred mechanism for compensatory mitigation because it may involve larger, more ecologically valuable compensatory mitigation projects compared to permittee-responsible mitigation, which is described below.

No local opportunities for potential in-lieu fee mitigation projects with a non-profit organization or government organization that would conduct mitigation offsite have been identified.

1.2.3 Permittee-Responsible Mitigation

A permittee may be required to provide compensatory mitigation through an aquatic resource restoration, establishment, enhancement, and/or preservation activity. This compensatory mitigation may be provided at or adjacent to the impact site (i.e., on-site mitigation) or at another location, usually within the same watershed as the permitted impact (i.e., off-site mitigation). The permittee retains responsibility for the implementation and success of the mitigation project (EPA/USACE 2008).

Compensatory mitigation for impacts to waters of the U.S. associated with the proposed action will be accomplished through permittee-responsible mitigation, because no mitigation banks currently exist in the Salmon River watershed and no local opportunities for in-lieu fee mitigation projects were identified.

1.3 Mitigation Ratios

The USACE, Walla Walla District determines wetland mitigation ratios in coordination with the EPA, and other interested agencies. Based on a preliminary discussion with USACE, the mitigation ratios for wetland and stream impacts associated with the TCMC project are expected to be as follows:

- Forested wetland = 5:1 (5 acres of mitigation to 1 acre of impact)
- Scrub shrub wetland = 3:1
- Emergent marsh wetland = 1.5:1
- Headwater streams = 1:4 (1 foot of perennial stream to 4 feet of headwater stream)

Most of the impacted streams are ephemeral and do not support significant riparian or wetland vegetation along the streambanks. Bruno Creek and Mill Creek are perennial streams and do have some wetland vegetation associated with them.

Stream reaches that do include minor amounts of riparian vegetation and small wetlands provide the following functions and services. Riparian corridors provide the following:

- habitat for song birds
- cover for wildlife
- browse for deer
- shading for water temperature control

Wetlands adjacent to the streams or upslope corridors provide the following:

- sediment stabilization
- groundwater recharge during seasonal snowmelt
- groundwater discharge associated with seeps and springs
- provides habitat for small aquatic animals

TCMC is proposing to mitigate for wetland and stream impacts associated with the Phase 8 mine expansion by restoring wetlands along Squaw Creek, protecting streambanks from livestock damage associated with bank caving, vegetation impacts, and erosion along streambanks, and stabilizing a short segment of eroded streambank along Squaw Creek. The proposed mitigation ratio for impacted headwater streams and mitigation along Squaw Creek (perennial) is 1:4 (1 foot of perennial stream to 4 feet of headwater stream). Based on this ratio, mitigation would only be required along 2,475 linear feet of streambank.

During the multi-agency on-site meeting on October 5, 2011, representatives of the various agencies (USACE, EPA, U.S. Fish and Wildlife Service [USFWS], U.S. Forest Service [USFS], Idaho Department of Water Resources [IDWR], Bureau of Land Management [BLM], and National Oceanic and Atmospheric Administration [NOAA] fisheries) agreed that the majority of the streambank could be rehabilitated by fencing off livestock and allowing natural recovery processes to occur. Based on this conclusion the proposed mitigation along Squaw Creek would include fencing along approximately 10,000 linear feet (approximately a 1:1 ratio) of streambank along Squaw Creek.

All proposed mitigation would occur on TCMC property. New Fencing would be tied in with land along Squaw Creek that is already fenced. Any future grazing in that area will be controlled and

monitored to protect vegetation communities and water quality along Squaw Creek. Table 1 provides an overview of the impacts, proposed mitigation, and their associated costs. The details of the proposed mitigation are described in the following sections of this mitigation plan.

Table 1. Impacts and Proposed Mitigation

Impacts	Impact Amount	Mitigation Quantities*	Proposed Mitigation
Wetlands	3.36 ac	5.64 ac	Restore selected wetland area (5.7 acres) along Squaw Creek.
Streams	9,899 LF	see Proposed Mitigation	Squaw Creek bank protection (fencing of 10,000 feet of stream)

*Based on mitigation ratios described above
ac=acres
LF=linear feet

2.0 PROPOSED WETLAND AND STREAM MITIGATION

2.1 Mitigation Objectives and Site Selection Criteria

The mitigation objectives identified and used to develop site selection criteria include the following:

- Enhance/restore former or degraded wetlands to compensate for potential wetland impacts associated with Phase 8 mine expansion.
- Protect and stabilize streambanks from damage caused by livestock along stream reaches to compensate for stream impacts associated with Phase 8 mine expansion.
- Provide mitigation that is sustainable over the long-term without human intervention beyond the establishment period.
- Restore, enhance, and preserve the following habitats:
 - Palustrine scrub shrub (PSS);
 - Palustrine emergent marsh (PEM);
 - Palustrine wet meadow (WM);
 - Upland buffer (UB).

Site selection criteria include the following:

- Wetland and stream mitigation occurs within the same watershed as impacts;
- Accomplish mitigation on lands owned by TCMC to ensure protection in the future;
- Mitigation where hydrology is suitable to sustain wetlands without structural controls;
- Ecologically important streams tributary to Salmon River.

TCMC requested that HDR evaluate mitigation opportunities on TCMC property to meet the mitigation objectives. The stream corridor that selected for mitigation is land adjacent to Squaw Creek north of Salmon River, about 4 miles southeast of the mine.

Squaw Creek and the mine itself are located in Basin 72 (IDWR administrative boundary) in Custer County, Idaho, approximately 25 miles west of Challis, Idaho. Figure 2 shows the location of the proposed mitigation site, which is located north of the Salmon River, approximately 25 miles west of Challis. Appendix A includes a map index and maps that provide an overview of the selected mitigation site.



3.0 FIELD RECONNAISSANCE/BASELINE CONDITIONS

HDR and TCMC examined potential mitigation opportunities along Squaw Creek below the TCMC guard station in June 2010. The site was revisited on June 6, 2011. The team observed historic and current land uses that may have impacted wetlands and streams. They documented specific reaches of eroded streambanks that could be stabilized, and former wetlands that could be enhanced to serve as mitigation for wetland and stream impacts associated with the TCMC Phase 8 expansion. The field team took field notes and many photographs, which were cross-referenced to a global positioning system (GPS) location.

On October 5, 2011, representatives of USACE, IDWR, EPA, USFS, USFWS, and NOAA fisheries participated during an on-site review of the proposed mitigation measures.

In January 2012, TCMC decided not to use the Buckskin drainage as a waste rock facility, which reduces the impacts to streams and wetlands, and therefore, requires less mitigation. As a result, some of the proposed mitigation described in the original TCMC *Wetland and Stream Mitigation Plan* are no longer required and are not included in this report. Results of the field observations, documented baseline conditions, and proposed mitigation measures along Squaw Creek are summarized in the following sections.

3.1 Squaw Creek Baseline Conditions

TCMC owns most of the land along the east side of Squaw Creek between the confluence with Salmon River and below the bridge near the Thompson Creek guard station, 3.5 miles to the north. This area includes many mitigation opportunities for wetland restoration and streambank stabilization.

Flows in Squaw Creek on the day of the first site visit (June 25, 2010) were approximately 94 cubic feet per second (cfs) and approximately 145 cfs during the second site visit on June 6, 2011 (U.S. Geological Survey [USGS] 13297355).

The area along Squaw Creek consists of scrub shrub wetland, emergent marsh wetland, wet meadow, and fallow land. The existing emergent marsh and scrub shrub wetlands support willows along Squaw Creek; sedges and rushes dominate the marsh areas and wet meadow wetlands, which are saturated to inundated throughout most of the growing season. The wet emergent marsh and meadow wetlands are supported by a combination of groundwater and irrigation.

Portions of the Squaw Creek wetlands have been modified over the years by placing fill, draining, and grazing. TCMC personnel indicated that a man camp was constructed approximately 0.7 miles upstream from Salmon River during the mine construction period in the early 1980s. Water treatment ponds were constructed and fill was brought in for the man camp. The water treatment ponds have since been abandoned, but the fill remains on site, mostly along the east side of Squaw Creek. The land adjacent to the filled area is dry pasture. Fill material of unknown origin (gravel, concrete, earth material) was also placed east of Squaw Creek, approximately 1.2 miles upstream from Salmon River. Just to the north of this filled, upland area is an emergent marsh wetland. To the north of this area, some of the former wetlands were converted into grazing areas by draining them and/or placing fill in the low lying areas. TCMC has constructed fencing around some of the wetland areas and along portions of Squaw Creek to prevent livestock from damaging the streambanks. However, as a result of historic land use and periods of high flow, portions of the streambanks along Squaw Creek are experiencing continuous erosion and sloughing, especially during spring runoff, as observed during the June 2011 site visit.

4.0 PROPOSED MITIGATION PLAN

Most of the impacts from the Phase 8 mine expansion would be to palustrine emergent marshes and headwater streams. TCMC owns land that would be suitable for compensatory mitigation, which would satisfy the requirement to replace the function and value of affected wetlands and streams. The proposed mitigation plan, which includes the selected wetland and stream mitigation measures along Squaw Creek, is described below.

4.1 Squaw Creek

Many areas along Squaw Creek, between Salmon River and the bridge near the Thompson Creek guard station, are currently dry meadow, parts of which were most likely wetlands in the past. These areas include mitigation opportunities for wetland restoration and establishment as well as streambank stabilization along Squaw Creek. The wetland area and streambanks along Squaw Creek that were selected as mitigation sites have been adversely affected through historic land uses, such as placing fill in wetland areas, draining wetlands, and livestock grazing. Sections 4.1.1 and 4.1.2 outline the necessary steps to accomplish wetland restoration in selected areas along Squaw Creek.

4.1.1 Restore Wetlands

Initially, seven specific sites were identified as suitable locations to restore wetlands. However, not all seven sites will be needed to compensate for project losses. The seven sites are located within the floodplain of Squaw Creek and supported wetlands in the past. Restoration of these historic wetlands is feasible due to the mostly-level topography, shallow groundwater, and available surface water from Squaw Creek. Restored wetlands would provide excellent habitat for a variety of plant and animal species. Objectives for restoring wetlands along Squaw Creek include:

- Wetland restoration is within the same watershed as the impacted wetlands.
- Wetlands would be sustainable without human intervention 3 to 5 years following construction and implementation of adaptive management measures.
- Restored wetland areas would be managed for wetland values.
- Restored wetlands would be fenced to control access, future use, and manage potential grazing rotation.
- Restored wetlands would not adversely impact water temperatures or flow rates in Squaw Creek

To accomplish these objectives, fill material that was placed in the selected wetland areas would be removed to within 2 to 6 inches of the water table so the groundwater table would provide the hydrology to support the wetlands and create areas of standing water to support emergent vegetation. Surface water would only be applied to the wetland during the vegetation establishment period (1 to 3 years). No water would be returned from the wetland to Squaw Creek. Therefore water quality would not be affected. The selected wetland restoration site is shown on map 1 in Appendix A. Summaries of the cost to restore the wetland is presented in Table 2. For cost estimating purposes, it is assumed an outside contractor will restore the wetlands.

The work sequence for restoring wetlands would be as follows:

1. Survey topography
2. Prepare design plans/specifications
3. Grub existing vegetation
4. Salvage viable topsoil
5. Remove fill material to restore groundwater hydrology
6. Excavate depressions to intercept groundwater
7. Finish grade all areas to receive topsoil
8. Distribute topsoil
9. Seed with wetland seed mixture
10. Mulch seeded areas with 2000 pounds per acre weed free straw
11. Plant shrub transplants
12. Fence (four-strand barbed wire) to protect from livestock and vehicle access
13. Install wildlife habitat structures
14. Monitor progress over establishment period (estimated to be 3 to 5 years)
15. Provide a conservation easement or other legal mechanism to protect the wetlands in perpetuity

4.1.2 Estimated Costs of Restoring Wetlands along Squaw Creek

During the June 2011 site visit, seven specific locations were identified as potential wetland restoration sites. The location and area of each of the potential wetlands was documented with a global positioning system (GPS) unit. The amount of fill that would have to be removed to allow self sustaining wetlands to exist was estimated based on site conditions observed in the field. During the October 5, 2011 on-site agency meeting, it was agreed that the selected wetland areas would be the most suitable locations to create wetlands. For costing purposes, it is assumed that fill can be moved to a location within one-half mile of the wetland sites. The cost to restore wetlands is broken down in table 2.

4.1.2.1 Selected Wetland Areas

The proposed wetland area is shown on map 1 in Appendix A. Wetland area 1 (5.7 acres) had approximately 4 feet (average) of earthen fill placed in this area. Much of the fill consists of gravel and cobbles. Existing vegetation is dominated by wildrye. The fill material would be removed to a depth approximately 2 to 6 inches above the groundwater table to provide the hydrology to sustain emergent and wet meadow wetland plant communities. Areas that are excavated and graded would be seeded with a wetland seed mixture described in Section 5.0 of this plan.

To protect the wetland after restoration, 1,980 linear feet of four-strand barbed wire fencing would be constructed. This fencing can be tied in with existing fencing along the gravel road. It is assumed that TCMC would supply and deliver the required materials (logs, boulders, brush) to create habitat structures. The cost would increase if these materials are furnished by a contractor. Table 2 summarizes the cost to perform the necessary work to complete wetland area 1.

Table 2. Selected Wetland Area 1

Item Number	Item Description	Unit	Quantity	Unit Price In-Place	Total Cost
1	Remove fill (5.7 acres at 4 ft depth)	CY	36,784	\$ 4.00	\$ 147,136.00
2	Wetland Seeding and mulching	Acre	5.7	\$ 2,200.00	\$ 12,540.00
3	Habitat Structures (snags, woody debris piles with boulders)	EA	6	\$ 500.00	\$ 3,000.00
4	Fencing	LF	1980	\$ 4.25	\$ 8,415.00
5	Mobilization	LS	1	\$ 3,000.00	\$ 3,000.00
6	Demobilization	LS	1	\$ 3,000.00	\$ 3,000.00
Total Cost					\$ 177,091.00
Contingency (20%)					\$ 35,418.20
Total estimated cost including contingency					\$ 212,509.20
CY = cubic yards; EA = each; LF = linear feet; LS = lump sum					

4.1.3 Wetland Area Selected for Mitigation

Out of the seven sites reviewed, the proposed wetland area was selected for mitigation for the following reasons:

- The area supports mostly upland plant communities.
- Monitoring and maintaining one large wetland area would be easier than monitoring multiple smaller wetland areas.
- The proposed wetland area 1 (5.7 acres) is the largest wetland complex of the seven sites that were evaluated, which would result in greater ecological value than combining multiple smaller wetland areas.
- All proposed wetland areas, including the selected area, would be self-sustaining (i.e., high groundwater and/or seasonal overbank flooding from Squaw Creek).

4.2 Squaw Creek Bank Stabilization

The streambanks along Squaw Creek are experiencing erosion, undermining, and sloughing, which typically occur in areas with little or no shrub or tree vegetation. During the multi-agency on-site meeting on October 5, 2011, representatives of the various agencies (USACE, EPA, USFWS, USFS, IDWR, and NOAA fisheries) agreed that the majority of the streambank could be rehabilitated by fencing off livestock and allowing natural processes to occur. Some areas were identified that would benefit from bank treatment in addition to fencing out livestock. Some of these areas are on BLM property, shown on map 3, and the area called out on map 4. In January 2012, BLM informed USACE that no mitigation is to occur on their land in the Squaw Creek drainage. Therefore, the only area suitable for streambank restoration is shown on map 4.

Streambank restoration would include placing coir rolls where moderate toe stabilization is required in conjunction with reseeding selected areas with perennial seeding mixtures and planting willow plugs. Coir rolls provide an excellent medium for promoting plant growth at the water's edge. Approximately 100 feet of streambank will require this type of streambank restoration (see this area on map 4).

TCMC started constructing fencing along portions of Squaw Creek, but most of the significantly eroded areas have not yet been fenced off. Specific eroded areas along Squaw Creek were identified during site visits. Maps 2 through 4 show proposed fencing.

Table 3 lists the total estimated costs of fencing 10,000 linear feet of stream and stabilizing 100 feet of streambank along Squaw Creek, adding habitat structures such as logs. To protect 10,000 linear feet of streambank, 14,150 linear feet of fencing would be required.

Table 3. Estimated Costs of Squaw Creek Bank Stabilization

Item Number	Item Description	Unit	Quantity	Unit Price In-Place	Total Cost
1	Boulders	EA	15	\$ 200.00	\$ 3,000.00
2	Logs	EA	10	\$ 250.00	\$ 2,500.00
3	Streambank revegetation	100 FT	1	\$ 450.00	\$ 450.00
4	Fencing	LF	14,150	\$ 4.25	\$ 60,137.50
Total cost					\$ 66,087.50
Contingency (20%)					\$ 13,217.50
Total estimated cost including contingency					\$79,305.00
FT = feet; LF = linear feet; LS = lump sum					

Items 1 and 2: Boulders and logs would be provided by TCMC.

Item 3: Total cost per 100 feet of streambank revegetation equals \$450. This includes planting of willows, cottonwood trees, seeding, mulching, and fertilizing.

Item 4: Some sections along the east side of Squaw Creek are fenced off to prevent livestock from causing damage to the banks. Grazing occurs on both sides of Squaw Creek; therefore, both sides of the creek would need to be fenced. Some areas along the stream would not require fencing because the creek is adjacent to rock outcrops and other areas that are inaccessible to livestock.

4.2.1 Site Protection Instrument

TCMC will provide a site protection instrument in the form of a declaration of restrictions to protect the mitigation lands in perpetuity. A copy of the proposed declaration of restriction is included in Appendix B of this plan.

5.0 PLANT SCHEDULE AND WETLAND SEED MIXTURE

Table 4 presents the wetland seed mixture that would be seeded to produce wet meadow and emergent marsh plant communities in the enhanced wetland areas described in the previous sections of this mitigation plan.

Table 5 presents the plant schedule for tree and shrub transplants.

Table 4. Wetland Seed Mixture Schedule

Seed No.	Species Name		Drill Seeding			Wetland Indicator Status*
	Scientific Name	Common Name	No. of Seeds/Pound	Pounds Pure Live Seed/Acre	Percent of Mix	Region 9
1	<i>Deschampsia caespitosa</i>	Tufted hairgrass	2,500,000	4	11.76%	FACW
2	<i>Carex rostrata</i>	Beaked sedge	444,000	3	8.82%	OBL
3	<i>Carex nebrascensis</i>	Nebraska sedge	534,100	7	20.58%	FACW
4	<i>Calamagrostis canadensis</i>	Bluejoint	2,270,000	7	22.58%	FACW
5	<i>Agrostis scabra</i>	Ticklegrass	----	5	14.70%	FAC
6	<i>Eleocharis palustris</i>	Creeping spikerush	620,000	6	17.64%	OBL
7	<i>Juncus balticus</i>	Baltic Rush	10,900,000	2	5.88%	FACW
Total				34	100.00%	

*The "1996 wetland indicator status" is based on a plant species frequency of occurrence in wetlands:

OBL = obligate wetland plants are species that almost always occur in wetlands under natural conditions with estimated probability of 99 percent;

FACW = facultative wetland plants are species that usually occur in wetlands with estimated probability of 67-99 percent;

FAC = facultative plants are equally likely to occur in wetlands or non-wetlands with estimated probability of 34-66 percent.

Table 5. Plant Schedule

Scientific Name	Common Name	Height (ft)
<i>Populus trichocarpa</i>	Black Cottonwood	4-6
<i>Salix sp.</i>	Willow	2-4
<i>Cornus stolonifera</i>	Red Twig Dogwood	2-4

6.0 ECOLOGICAL PERFORMANCE STANDARDS

Performance standards are observable or measurable physical, chemical, and/or biological attributes that are used to determine if a compensatory mitigation project meets its objectives.

The ecological performance standards described in the following sections provide benchmarks for measuring achievement of the goals and objectives of the mitigation areas. Mitigation activities are intended to meet these performance standards within a specified time frame. These function-based performance standards correlate design, monitoring, and demonstrated improvements in site conditions.

6.1 Grading/Hydrologic Performance Standards

The grading/hydrologic performance standards help to document and verify that the ground elevations are established to allow for a hydrologic regime that will support the desired plant communities over the long-term without human intervention.

After construction, ground elevations will be reviewed and it will be determined if the site grading has achieved the design elevations necessary to establish wetland conditions and provide hydrology to sustain the desired plant communities. Delineating the wetland areas at the mitigation sites will demonstrate the wetland area has developed/increased in size and functionality, including an increase in wetland area, soil saturation and inundation.

Increasing the wetland area adjacent to Squaw Creek provides a larger area for floodwaters to be stored and treated by vegetation and soils prior to entering the stream, which will result in a functional lift to water quality within Squaw Creek and Salmon River.

6.2 Vegetation Performance Standards

6.2.1 Weed Management

The goal is to have no more than 10 percent weedy species making up the vegetation coverage in each mitigation area. Weedy species include species listed on the Idaho noxious weed list and undesirable invasive species.

6.2.2 Desirable Plant Communities

The goal is to have 75 percent of the mitigation areas sustain a plant coverage of desirable plant communities containing cottonwood (*Populus* sp.), willow (*Salix* sp.), sedge (*Carex* sp.), rush (*Juncus* sp.), and wetland grasses and forbs.

Measuring vegetation diversity and productivity will demonstrate an increase in vegetation classes, coverage by desirable plant communities, and number of vegetation strata. Vegetation provides surface roughness to slow floodwaters, which reduces erosion and encourages sediment deposition.

Establishing canopy closure and increasing the number of vegetation strata will provide habitat structure and increase uptake of nutrients introduced to the site by stormwater runoff.

7.0 MONITORING/ADAPTIVE MANAGEMENT

A qualified landscape architect or wetland ecologist would conduct field-monitoring of wetland restoration and streambank stabilization areas. The field investigations would monitor progress of each mitigation area annually for the first 4 years to determine the success of the wetland/riparian habitats and their replacement functions relative to the goals and objectives. The monitoring schedule would coincide with the appropriate season relative to the field data to be gathered. If the projects progress successfully, final monitoring would include a wetland delineation in the established wetland mitigation areas in year 5.

The field-monitoring effort could consist of the following key steps:

- Establish photo points prior to beginning construction of the mitigation work and take photographs during construction to document construction techniques.
- Take photographs during monitoring to qualitatively record the condition and percent of vegetative cover, soil test pits, and hydrologic conditions.
- Visually estimate and record dominant vegetation species and percent cover during each monitoring session.
- Review soil saturation by digging soil test pits along established transects in each wetland restoration area.
- Review hydrology by inspecting the water supplies to determine if all areas of the mitigation sites are receiving adequate water to support desirable wetland vegetation.

TCMC and its consultant would also lead annual site visits for USACE, EPA, Idaho Department of Fish and Game (IDFG) and other interested agency personnel to facilitate agency review and coordination.

7.1 Monitoring Reports

By December 15 of each monitoring year, a written monitoring report will be submitted to USACE and EPA. The report prepared for the first monitoring year will include “as built” drawings of each wetland mitigation project, showing site condition topography, planted areas, fencing, site dimensions, water supply and control features. Any deviations from the original mitigation plan will be documented. The report will include construction photographs taken from established photo points.

Subsequent monitoring reports will summarize field observations of wetland development, vegetation cover, soils, hydrology, and use by wildlife species. Photographs taken from the established photo points will show vegetation conditions and wetland habitat quality.

7.2 Maintenance/Adaptive Management

The mitigation areas will be designed to operate and function with minimal or no required maintenance or human intervention after vegetation establishment. Restored wetland areas with connections to groundwater will be visited quarterly during the first year of operation to ensure that there is adequate hydrology to support the wetland throughout the growing season.

Other periodic maintenance and adaptive management activities may include soil treatments, weed control, vegetation protection, and supplemental planting as necessary to meet project goals and objectives. Soil treatments may include application of amendments such as fertilizer and mulch. Vegetation manipulations may include weed control, staking woody tree stems, and

installing protective barriers around individual plants or portions of sites to provide protection from livestock and wildlife.

A qualified landscape architect or wetland ecologist will make recommendations to TCMC related to the need for maintenance, based on site observations. Any recommendations for maintenance will be included in the monitoring reports submitted to the responsible agencies. TCMC or their contractors will perform required maintenance.

7.3 Long-term Maintenance Plan

1. The wetland mitigation area will be managed in perpetuity once the final performance standards have been met.
2. TCMC will be the responsible party for long-term maintenance of the mitigation areas. This perpetual maintenance requirement may be transferred from TCMC to a third party as approved by USACE.
3. TCMC will conduct a minimum of two annual inspections of the mitigation areas to ensure hydrology is functional, fences are maintained, litter is removed, and unlawful disposal is not occurring.
4. All Idaho-listed noxious weeds will be controlled at the mitigation areas in perpetuity. Weed control will be accomplished by hand removal or aquatic-label herbicide treatment as needed.
5. All maintenance required as part of the long-term management will be by conducted by TCMC or their designated contractor(s).
6. A declaration of restrictions will be recorded on the mitigation parcels to protect the site in perpetuity regardless of property ownership.

8.0 FINANCIAL ASSURANCES

In discussion with the USACE Walla Walla District, Regulatory Division, the following financial assurance options for wetland mitigation are acceptable:

- Letter of credit
- Causality insurance
- Performance bond
- Escrow account

9.0 SUMMARY

9.1 Summary of Wetland Impacts

The project would impact 3.36 acres of jurisdictional wetlands. Proposed mitigation for wetland impacts is summarized in Table 6.

Table 6. Summary of Wetland Impacts and Proposed Mitigation

Wetland Location	Impacted Wetlands (ac)	Wetland Type	Mitigation acreages*	Proposed Mitigation
Bruno Creek	0.032	PFO	0.16	Selected Wetland Area (5.7 acres)
West Fork Bruno Creek	0.140	PFO	0.67	Selected Wetland Area (5.7 acres)
West Fork Bruno Creek	0.007	PEM	0.01	Selected Wetland Area (5.7 acres)
Pat Hughes	0.260	PEM	0.39	Selected Wetland Area (5.7 acres)
Mill Creek	2.925	PEM	4.41	Selected Wetland Area (5.7 acres)
Total	3.36		5.64	5.7 acres

*Required mitigation acreage based on mitigation ratios.

ac = acres

PFO = Palustrine forested

PEM = Palustrine emergent marsh

9.2 Summary of Stream Impacts

The project would impact 9,899 linear feet of headwater streams. Proposed mitigation for stream impacts is summarized in Table 7.

Table 7. Summary of Stream Impacts and Proposed Mitigation

Stream Description	Impacted Lengths (LF)	Proposed Mitigation
Bruno Creek and its tributaries	1,753	Bank stabilization on Squaw Creek = 100 feet Streambank protected from livestock = 10,000 feet
Pat Hughes	3,749	
Mill Creek	4,396	
Total	9,899	

LF=linear feet

10.0 REFERENCES

USACE, EPA. Compensatory Mitigation for Losses of Aquatic Resources; Final Rule. 73 Fed. Reg. 19594 (Apr. 10, 2008).

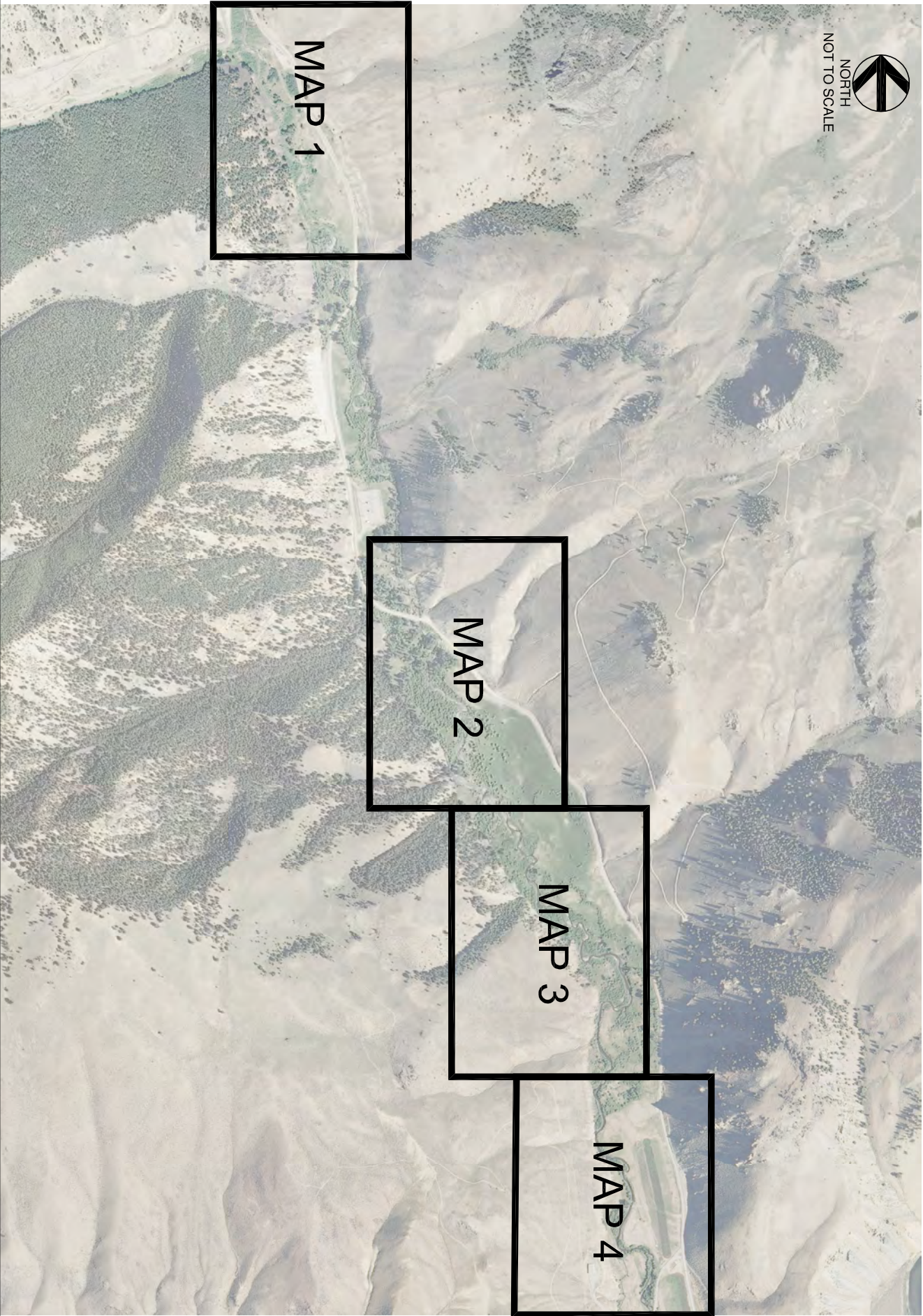
USACE, EPA, USFWS, NOAA. Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.
<http://www.fws.gov/habitatconservation/Corps%20In-lieu-fee%20guidance.pdf> Accessed May 10, 2011).

USACE, Greg Martinez. July 7, 2011. Phone conversation with Christine Whittaker related to mitigation ratios.

USACE, Greg Martinez. January 17, 2012. Email to HDR related to mitigation requirements based on the October 5, 2011 on-site agency meeting.

Appendix A

Maps of Proposed Mitigation Sites Squaw Creek



MAP 1

MAP 2

MAP 3

MAP 4

Thompson Creek Mining Company

Wetland / Stream Mitigation Plan

Squaw Creek Restoration & Protection Plan

Overview of Proposed Wetlands and Proposed Fencing

Applicant: Thompson Creek Mining Company

Waterway: Squaw Creek

Custer County, Idaho

Date: May, 2013

Appendix A - Key Map



150 0 150 300
Scale: 1" = 300'

BLM
Managed
Land

▲ BLM Property ▲

Proposed Wetland
+/- 5.7 AC

TCMC Property

▲ BLM Property ▲

Squaw Creek

BLM
Managed
Land

- Legend**
- Stream
 - Stream Flow Direction
 - Existing Fence
 - Proposed Wetland Fence
 - BLM Property Line
 - Proposed Wetlands
 - Depression

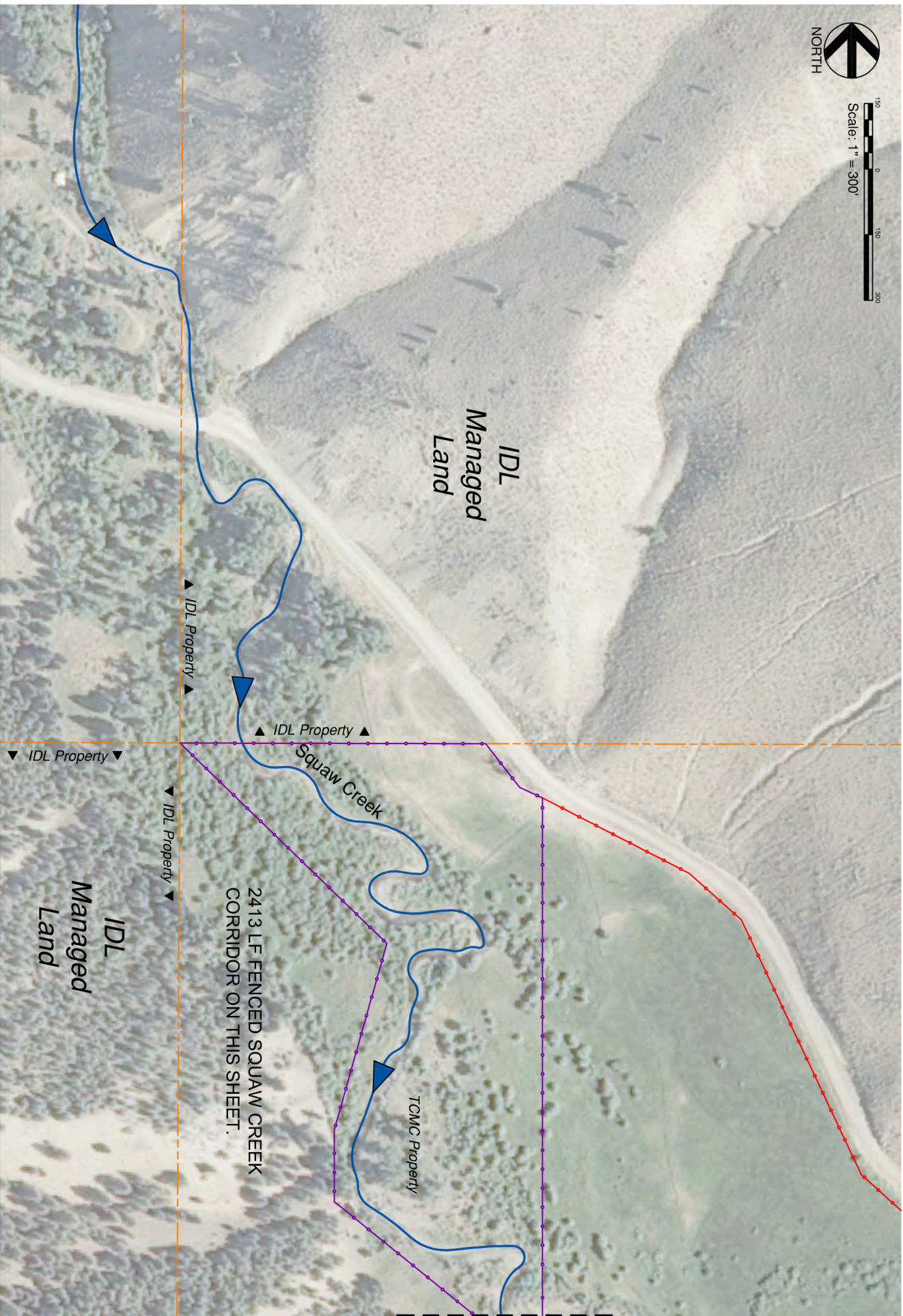
Thompson Creek Mining Company
Wetland / Stream Mitigation Plan
Squaw Creek Restoration & Protection Plan

Overview of Proposed Wetland I

Applicant: Thompson Creek Mining Company
Waterway: Squaw Creek
Custer County, Idaho
Date: May, 2013
Appendix A - Map 1



150
0
150
300
Scale: 1" = 300'

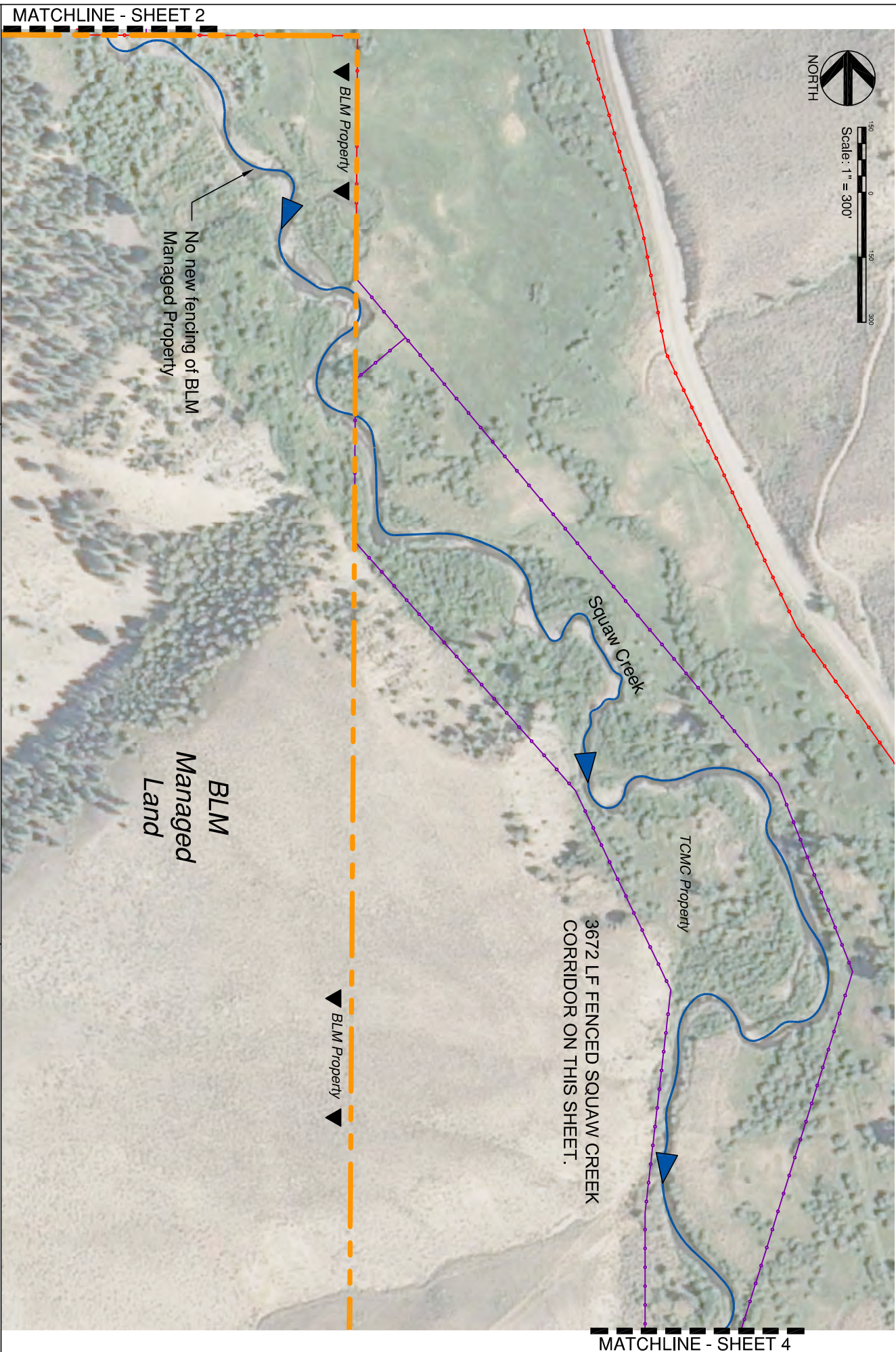
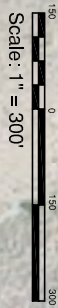


Legend

- Stream
- Stream Flow Direction
- Existing Fence
- Proposed Streambank Fence
- IDL Property Line

Thompson Creek Mining Company
Wetland / Stream Mitigation Plan
Squaw Creek Restoration & Protection Plan
Overview of Proposed Fencing and Wetland II

Applicant: Thompson Creek Mining Company
Waterway: Squaw Creek
Custer County, Idaho
Date: May, 2013
Appendix A - Map 2



Legend

- Stream
- Stream Flow Direction
- Existing Fence
- Proposed Streambank Fence
- BLM Property Line

Thompson Creek Mining Company

Wetland / Stream Mitigation Plan

Squaw Creek Restoration & Protection Plan

Overview of Proposed Fencing

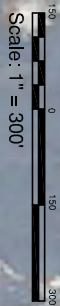
Applicant: Thompson Creek Mining Company

Waterway: Squaw Creek

Custer County, Idaho

Date: May, 2013

Appendix A - Map 3



BLM
Managed
Land

▲ BLM Property ▲

Irrigated Pasture
(Former Man-camp)

TCMC Property

Squaw Creek

2938 LF FENCED SQUAW CREEK
CORRIDOR ON THIS SHEET.

Approximate location of 100 feet
of streambank restoration.

MATCHLINE - SHEET 3



Legend

- Stream
- Stream Flow Direction
- Existing Fence
- Proposed Streambank Fence
- BLM Property Line

Thompson Creek Mining Company

Wetland / Stream Mitigation Plan

Squaw Creek Restoration & Protection Plan

Overview of Proposed Fencing

Applicant: Thompson Creek Mining Company

Waterway: Squaw Creek

Custer County, Idaho

Date: May, 2013

Appendix A - Map 4

Appendix B

Declaration of Restrictions **(To be developed)**

